

DEMOGRAPHIC STUDIES ON VARIOUS CARDIAC DISEASES IN DOGS*

K. Rajkumar and C. Ansar Kamran

Department of Veterinary Medicine, Veterinary College, KVAFSU, Hebbal, Bangalore 560024

Received:31.3.2016

Accepted:29.4.2016

ABSTRACT

The occurrences of various cardiac disorders on prospective study of 82 cases were studied. Dilated Cardiomyopathy was recorded in 37(45.1%) cases followed by Mitral Valve Disease in 26(31.7%), Hypertrophic Cardiomyopathy in 6(7.3%), Patent Ductus Arteriosus in 8(9.8%), Aortic Stenosis in 2(2.4%) and Atrial Septal defect in 2(2.4%) cases. Cardiac disease was found to be highest in Labrador Retriever (27.2%), followed by German Shepherd (15.2%). The occurrence of cardiac disease was 15.9 per cent in pups up to one year followed by 17 per cent in 1 to 3 years old dogs, 23 per cent in 3 to 6 years, 19 per cent in 6 to 9 years and 10 per cent above 9 years of age. With respect to gender, the occurrence of cardiac disease was more in males (68.5 %) than in females (31.5%).

Keywords: Cardiac diseases, dilated cardiomyopathy, Mitral valve disease, hypertrophic cardiomyopathy

INTRODUCTION

Cardiac diseases are one of the most commonly encountered diseases in canine and constant professional challenge for the veterinary clinician. A number of diseases affecting the heart are prevalent in dogs with acquired diseases being more common than congenital. Common cardiac diseases include myxomatous mitral valve degeneration, infective endocarditis, cardiomyopathy, pericardial effusion and congenital defects (Patent ductus arteriosus, aortic stenosis, atrial septal defect, ventricular septal defect etc). Approximately 10% of dogs presented to primary care have heart disease, and chronic valvular heart disease is the most common heart disease of dogs in many parts of the world, accounting for approximately 75% of canine cases of heart disease (Atkins et al., 2009). It is

well documented that certain highly predisposed breeds like the Cavalier King Charles Spaniels can show signs of myxomatous mitral valve degeneration with average initial diagnosis at 6.5 years, sometimes disease is seen as early as one to two years of age. This age was much lower than the average age of initial diagnosis of 12 years in other breeds (Beardow and Buchanan, 1993; Pedersen et al., 1999). Hence the present study was undertaken to study the incidence of various cardiac diseases in relation to the breed, age and gender.

MATERIALS AND METHOD

Dogs presented to Teaching Veterinary College Hospital, Bangalore, with clinical signs of inappetance, coughing, ascites, dyspnea and exercise intolerance suggestive of cardiac failure, were selected as subjects for the present study.

* part of doctoral thesis submitted to the Department of Veterinary Medicine, Veterinary College, Bengaluru of Karnataka Veterinary, Animal and Fisheries Sciences University (KVAFSU)
Corresponding author: Email: rajvet10@gmail.com Mobile +919894671682

All dogs were evaluated based on physical examination, radiography, electrocardiogram and echocardiography.

RESULTS

The occurrences of various cardiac disorders on prospective study of 82 cases are

depicted in Table 1. Dilated Cardiomyopathy (DCM) was recorded in 37(45.1%) cases followed by Mitral Valve Disease (MVD) in 26(31.7%), Hypertrophic Cardiomyopathy (HCM) in 6(7.3%), Patent Ductus Arteriosus (PDA) in 8(9.8%), Aortic Stenosis (AS) in 2(2.4%) and Atrial Septal defect (ASD) in 2(2.4%) cases.

Table 1: Occurrence of cardiac diseases in dogs (n=82)

Breed	Total
Dilated cardiomyopathy (DCM)	37(45.1%)
Mitral valve disease (MVD)	26(31.7%)
Hypertrophic cardiomyopathy (HCM)	6(7.3%)
Patent ductus arteriosus (PDA)	8(9.8%)
Aortic stenosis (AS)	2(2.4%)
Atrial septal defect (ASD)	2(2.4%)

Breed

The breed wise prospective analysis of 82 cases breed wise and disease wise are shown in Table 2. Cardiac disease was found to be highest in Labrador Retriever (32.9%), followed by German Shepherd (14.6%). Other breeds of dogs such as Mongrel, Pomeranian, Doberman, Golden Retriever, Pug, Dachshund, Boxer and Great Dane showed an occurrence of 9.8, 7.3, 7.3, 4.9, 4.9, 3.7, 2.4 and 2.4 per cent respectively.

Table 2: Breed wise distribution of various cardiac diseases in dogs (n=82)

Breed	DCM	MVD	Other cardiac diseases	Total	95 per cent Confidence Interval
Labrador Retriever	12(32.4%)	9(34.6%)	6(31.6%)	27(32.9%)	23.72-43.68
German Shepherd	4(10.8%)	5(19.2%)	3(15.8%)	12(14.6%)	8.57-23.86
Mongrel	2(5.4%)	4(15.4%)	2(10.5%)	8(9.8%)	12.38-29.37
Pomeranian	4(10.8%)	1(3.8%)	1(5.3%)	6(7.3%)	3.40-15.06
Doberman	3(8.1%)	1(3.8%)	2(10.5%)	6(7.3%)	3.40-15.06
Golden Retriever	3(8.1%)	0(0%)	1(5.3%)	4(4.9%)	1.91-11.88
Pug	2(5.4%)	1(3.8%)	1(5.3%)	4(4.9%)	1.91-11.88
Dachshund	1(2.7%)	2(7.7%)	0(0%)	3(3.7%)	1.25-10.21
Boxer	2(5.4%)	0(0%)	0(0%)	2(2.4%)	0.67-8.46
Great Dane	2(5.4%)	0(0%)	0(0%)	2(2.4%)	0.67-8.46
Other Breeds	2(5.4%)	3(11.5%)	3(15.8%)	8(9.8%)	5.03-18.09
Total	37(100%)	26(100%)	19(100%)	82(100%)	-

Demographic studies on various cardiac diseases in dogs

Age

The prospective analysis of various cardiac diseases age wise for the 82 cases are shown in Table 3, Fig 1. The occurrence of cardiac disease

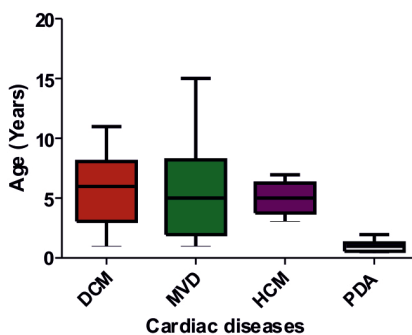
was 13 cases in pups up to one year followed by 17 cases in 1 to 3 years old dogs, 23 cases in 3 to 6 years, 19 cases in 6 to 9 years and 10 cases above 9 years of age.

Table 3: Age wise distribution of various cardiac diseases in dogs (n=82)

Age	DCM	MVD	Other cardiac diseases	Total	95 per cent Confidence Interval
0-1	1(2.7%)	5(19.2%)	7(36.8%)	13(15.9%)	9.51-25.26
1-3	9(24.3%)	5(19.2%)	3(15.8%)	17(20.7%)	13.37-30.72
3-6	12(32.4%)	5(19.2%)	6(31.6%)	23(28%)	19.48-38.59
6-9	12(32.4%)	6(23.1%)	1(5.3%)	19(23.2%)	15.37-33.38
>9	3(8.1%)	5(19.2%)	2(10.5%)	10(12.2%)	6.76-21.01
Total	37(100%)	26(100%)	19(100%)	82(100%)	-

Fig 1.

Box & Whiskers plot demonstrates age wise distribution of various cardiac diseases in dogs. The mean (+), median (line), Whiskers represent the 5th and 95th percentiles and range (bars).



Gender

It is evident from the sex wise prospective analysis of 82 cases with respect to various cardiac diseases wise (Table 4) that the occurrence of cardiac disease was more in males (73.2 %) than in females (26.8%).

Table 4: Sex wise distribution of various cardiac diseases in dogs (n=82)

Sex	DCM	MVD	Other cardiac diseases	Total	95 per cent Confidence Interval
Male	28(75.7%)	16(61.5%)	16(84.2%)	60(73.2%)	62.70-81.56
Female	9(24.3%)	10(38.5%)	3(15.8%)	22(26.8%)	18.44-37.30
Total	37(100%)	26(100%)	19(100%)	82(100%)	-

Fig 2. M mode LV measurement in DCM dog. Left ventricular function is depressed to varying degrees in this dog with dilated cardiomyopathy

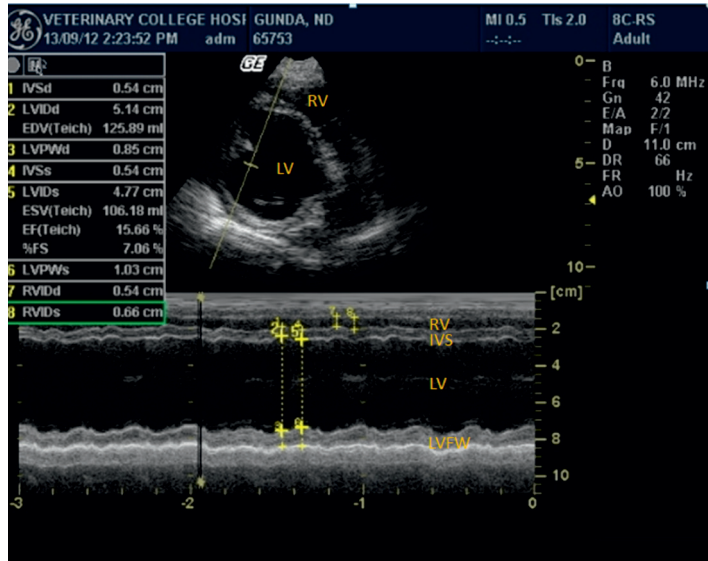


Fig 3. Right parasternal long axis echocardiogram, optimized for visualization of the mitral valve in a dog with myxomatous mitral valve degeneration. A thickened region is present at the tips of both valve leaflets creating a ‘club-like’ appearance

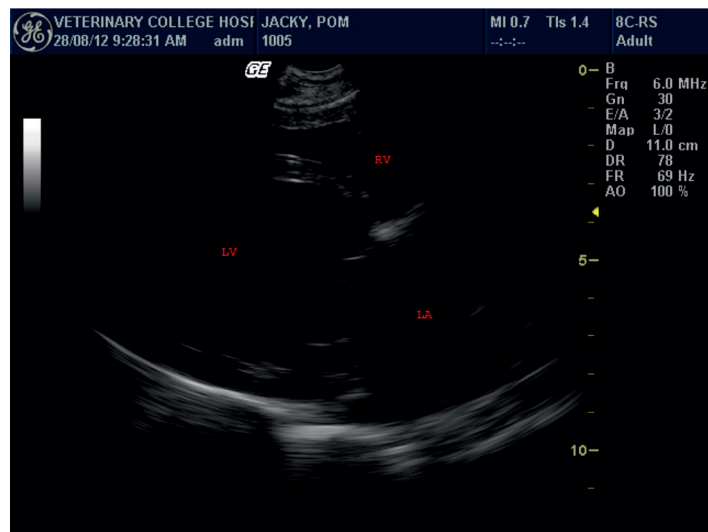
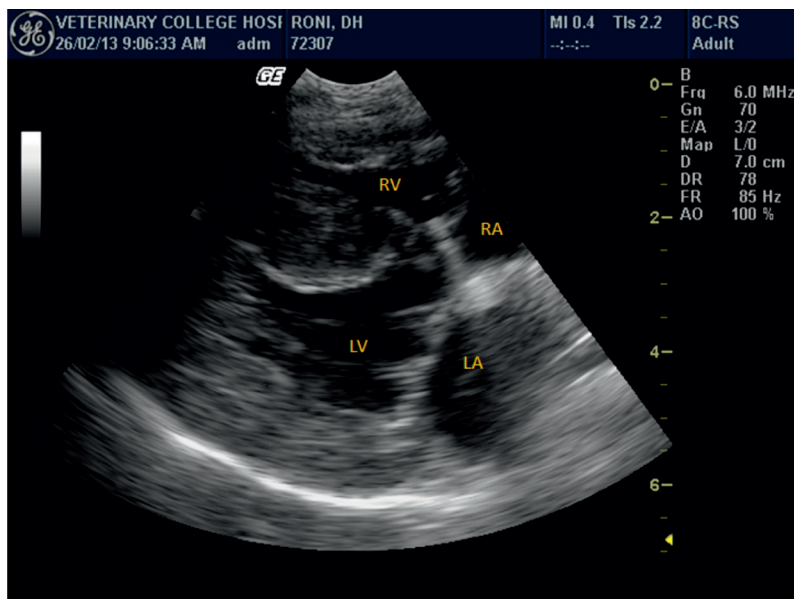


Fig 4. Right parasternal long axis view of a dog with HCM during diastole

DISCUSSION

Occurrence of cardiac disease

In the present study, 82 dogs presented with cardiac disease were examined. Dilated Cardiomyopathy (DCM) was recorded in 37(45.1%) dogs. The findings are in agreement with Cobb, (1992) and Tidholm *et al.*, (1997) who also reported DCM was one of the most commonly acquired cardiovascular diseases of dogs. On the contrary Buchanan (1977) and Atkins *et al.*, (2009) reported that chronic valvular heart disease as the most common heart disease of dogs in many parts of the world, accounting for approximately 75% of cases related to heart disease. Mitral Valve Disease (MVD) was recorded in 26(31.7%) dogs and various reports have indicated the occurrence of MVD to ranging from 21% to 89% in dogs (Detweiler and Patterson, 1965; Buchanan, 1977; Kogure, 1980). The occurrence of Hypertrophic Cardiomyopathy (HCM) was 7.3 per cent in the present study and similar findings were reported by Fox, (2003).

Patent Ductus arteriosus (PDA) was one of the most commonly recognised congenital cardiac disease which contributed to 9.8 per cent of the cases in the present study. The present findings concur with the earlier workers (Patterson, 1968; Tidholm, 1997; Kittleson, 1998; Buchanan, 1999) who reported PDA caused by the failure of the duct to close, one of the most commonly recognised congenital cardiac lesions found in dogs.

Aortic stenosis (AS) was recorded only in two cases in the present study, which differ from the findings of earlier workers (Buchanan, 1992; Tidholm, 1997; Bussadori *et al.*, 2001) who reported aortic stenosis as one of the most common canine congenital heart defects.

Breed

In the present study Labrador Retriever had the highest incidence of DCM and MVD followed by German Shepherd. Published literature lack documentation on DCM on Labrador retriever. But the earlier reports (Monnet *et al.*, 1995; Tidholm and Jonsson, 1997; Buchanan, 1999; Wess *et*

al., 2010; Stephenson et al., 2012) indicated that Doberman Pinscher is one of the most common breeds of dogs to develop DCM and smaller breeds were particularly predisposed to MVD (Olsen et al., 2003; Greer et al., 2007).

Age

The present study indicates that DCM and MVD were more common among 3 – 9 year of age. These findings are in accordance with earlier workers (Calvert et al., 1997; Petric et al., 2002) who reported that in the Doberman Pinscher, the disease was adult onset (median of 7.5 years at diagnosis) and appears particularly aggressive. Hence it is opined that adult dogs are highly prone to DCM and MVD. Aging process in dog affects the myocardium and the blood vessels in a way that depletes cardiovascular reserve and alters the responses to various illness and medications. In addition due to aging in dog there will be decrease in the response of the myocardium to beta-adrenergic stimulation and further aging has selective effects on peripheral vascular function, including a reduced arterial dilating response to sympathetic stimulation or catecholamines and during exercise it leads to increase in systolic blood pressure and left ventricular overload in older animals and hence, contributes to an increase in the incidence of cardiac disease in older dogs (Bright and Mears, 1997). In the present study DCM was recorded in 24.3 per cent and MVD was recorded in 19.2 per cent dogs of 1-3 years old. These findings corroborate with earlier workers (Beardow and Buchanan, 1993; Pedersen et al., 1999; Dambach et al., 1999) who documented that certain highly predisposed breeds like the Cavalier King Charles Spaniels can show signs of myxomatous mitral valve degeneration with average initial diagnosis at 6.5 years, sometimes disease is seen as early as one to two years of age and this age was much lower than the average age of initial diagnosis of 12 years in other breeds. An autosomal recessive pattern of inheritance may be responsible for this juvenile DCM (Sisson and Thomas, 1995; Dambach et al., 1999).

Age does not appear to be the only factor in the development of MVD; breed-specific and familial MVD, play a role for genetic inheritance (Swenson et al., 1996; Olsen et al., 1999; Olsen et al., 2003).

Gender

It is evident from prospective analysis that the frequency of cardiac disease was higher in male than in female dogs. A male predominance in the present study concur with earlier reports of Detweiler and Patterson, (1965), Swenson *et al.*, (1996), Martin et al., (2009).

REFERENCES

- Atkins, C.E., Bonagura, J., Ettinger, S., Fox, P., Gordon, S., Haggstrom, J., Hamlin, R., Keene, B., Luis-Fuentes, V. and Stepien R. (2009). Guidelines for the diagnosis and treatment of canine chronic valvular heart disease.. *J.Vet. Intern. Med.*, 23: 1142-1150
- Beardow, A.W. and Buchanan, J.W. (1993). Chronic mitral valve disease in cavalier King Charles spaniels: 95 cases. *J. Am. Vet. Med. Assoc.*, 203(7):1023-1029.
- Bright, J.M. and Mears, E. (1997). Chronic heart disease and its management. *Vet. Clin. North. Am. Small Anim. Pract.*, 27:1305-1328.
- Buchanan, J.W. (1977). Chronic valvular disease (endocardiosis) in dogs. *Adv. Vet. Sci. Comp. Med.*, 21:75-106.
- Buchanan, J.W. (1992). Causes and prevalence of cardiovascular disease. *In: Current Veterinary Therapy Edt. Kirk, R.W. and Bonagura, J.D.*, Philadelphia, PA: WB Saunders., pp 647–655.
- Buchanan, J.W. (1999). Prevalence of cardiovascular disorders. *In: Textbook of Canine and Feline Cardiology Edt. Fox, P.R., Sisson, D.D. and Moise, N.S. Edn. 2nd.*, Philadelphia, PA: WB Saunders., pp 457–470

- Bussadori, C., Quintavalla, C. and Capelli, A. (2001). Prevalence of congenital heart disease in Boxers in Italy. *J. Vet. Cardiol.*, **3**:7-11
- Calvert, C.A., Pickus, C.W., Jacobs, G.J. and Brown, J. (1997). Signalment, survival, and prognostic factors in Doberman Pinschers with endstage cardiomyopathy. *J. Vet. Intern. Med.*, **11**:323-326
- Cobb, M.A. (1992). Idiopathic dilated cardiomyopathy: advances in aetiology, pathogenesis and management. *J Small Anim Pract.*, **33**:113-118
- Dambach, D., Lannon, A., Sleeper, M. and Buchanan, J. (1999). Familial dilated cardiomyopathy of young Portuguese Water Dogs. *J. Vet. Int. Med.*, **13**: 65-71
- Detweiler, D.K. and Patterson, D.F. (1965). The prevalence and types of cardiovascular disease in dogs. *Ann. N.Y. Acad. Sci.*, **127**(1):481-516.
- Fox, P.R. (2003). Hypertrophic cardiomyopathy. Clinical and pathologic correlates. *J. Vet. Cardiol.*, **2**:39-45
- Greer, K.A., Canterberry, S.C. and Murphy, K.E. (2007). Statistical analysis regarding the effects of height and weight on life span of the domestic dog. *Res. Vet. Sci.*, **82**(2):208-214
- Kittleson, M. D. (1998). Patent ductus arteriosus. *In: Small Animal Cardiovascular Surgery Edt. Kittleson, M. D. Edn. 1st.*, Mosby, St. Louis, MO, USA., pp 218-230
- Kogure, K. (1980). Pathology of chronic mitral valvular disease in the dog. *Jpn. J. Vet. Sci.*, **42**(3):323-335.
- Martin, M. W. S., Stafford Johnson, M. J. and Celona, B. (2009). Canine dilated cardiomyopathy: a retrospective study of signalment, presentation and clinical findings in 369 cases. *J. Small. Anim. Pract.*, **50**: 23-29
- Monnet, E., Orton, C.E., Salman, M. and Boon, J. (1995). Idiopathic dilated cardiomyopathy in dogs: survival and prognostic indicators. *J. Vet. Intern. Med.*, **9**: 12-17
- Olsen, L.H., Martinussen, T. and Pedersen, H.D. (2003). Early echocardiographic predictors of myxomatous mitral valve disease in dachshunds. *Vet. Rec.*, **152**(10):293-297
- Olsen, L.H., Mow, T., Koch, J. and Pedersen, H.D. (1999). Heart rate variability in young, clinically healthy Dachshunds: influence of sex, mitral valve prolapse status, sampling period and time of day. *J. Vet. Cardiol.*, **1**(2):7-16
- Patterson, D. F. (1968). Epidemiologic and genetic studies of congenital heart disease in the dog. *Circ. Res.*, **XXIII**: 171-202
- Pedersen, H.D., Lorentzen, K.A. and Kristensen, B.O. (1999). Echocardiographic mitral valve prolapse in cavalier King Charles spaniels: epidemiology and prognostic significance for regurgitation. *Vet. Rec.*, **144**(12):315-320
- Petric, A.D., Stabej, P. and Zemva, A. (2002). Dilated cardiomyopathy in Doberman Pinschers: Survival, causes of death and a pedigree review in a related line. *J. Vet. Cardiol.*, **4**:17-24
- Sisson, D.D. and Thomas, W.P. (1995). Myocardial diseases. *In: Textbook of Veterinary Internal Medicine : Diseases of the dog and cat Edt. Ettinger, S.J. and Feldman, E.C. Edn 5th.*, Philadelphia, W.B. Saunders., pp 996
- Stephenson, H.M., Fonfara, S., Lopez Alvarez, J., Cripps, P. and Dukes Mcewan, J. (2012). Screening for Dilated Cardiomyopathy in Great Danes in the United Kingdom. *J. Vet. Intern. Med.*, **26**:1140-1147

- Swenson, L., Haggstrom, J., Kwart, C. and Juneja, R.K. (1996). Relationship between parental cardiac status in Cavalier King Charles spaniels and prevalence and severity of chronic valvular disease in offspring. *J. Am. Vet. Med. Assoc.*, **208**(12): 2009-2012
- Tidholm, A. and Jonsson, L. (1997). A retrospective study of canine dilated cardiomyopathy (189 cases). *J. Am. Anim. Hosp. Assoc.*, **33**:544–550
- Tidholm, A. (1997). Retrospective study of congenital heart defects in 151 dogs. *J. Small Anim. Pract.*, **38**:94–98
- Tidholm, A., Svensson, H. and Sylven, C. (1997). Survival and prognostic factors in 189 dogs with dilated cardiomyopathy. *J. Am. Anim. Hosp. Assoc.*, **33**:364-368
- Wess, G., Schulze, A., Geraghty, N. and Hartmann, K. (2010). Ability of a 5-Minute Electrocardiography (ECG) for Predicting Arrhythmias in Doberman Pinschers with Cardiomyopathy in Comparison with a 24-Hour Ambulatory ECG. *J. Vet. Intern. Med.*, **24**:367– 371